REMARKS

The July 31, 2006 Office Action rejects all pending claims 1-33. Claims 1-33 (6 independent, 27 dependant claims) remain pending in the application. Applicants respectfully request reconsideration and allowance of the pending claims.

Claim Rejections

As will be discussed in greater detail below, no combination of the references teaches or suggests a method or an apparatus for polishing a surface of a work piece having a low-k material using an orbital polishing apparatus. Indeed, no reference or combination of references teaches or suggests any orbital polishing process conditions, e.g., the orbital rate, pressure, and velocity as set forth in the pending claims.

Claims 1-9, 26-29 and 32-33 stand rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,554,064, issued to Breivogel et al. on September 10, 1996 (hereinafter "Breivogel") in view of United States Patent No. 6,270,395, issued to Towery et al. on August 7, 2001 (hereinafter "Towery"). Applicants traverse this rejection.

To render a claim obvious, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There must be a reasonable expectation of success. In addition, the prior art relied upon must teach or suggest all the claim limitations. None of these criteria are met in this case.

Breivogel generally discloses a method and apparatus for polishing, employing offset axially rotating members (column 2, lines 55-60). Breivogel does not disclose any workpieces with low-k material, nor does it disclose or suggest any particular method, apparatus or portions thereof for removing material from a workpiece comprising low-k.

The Towery reference discloses and focuses upon oxidizing slurries that *may* be used for removal of low dielectric constant materials within a chemical polishing process ("CMP"). While Towery discloses CMP as one processing aspect that may incorporate the oxidizing slurries, Towery merely mentions in cursory fashion, an orbital device, without providing any specific details, parameters or teachings for removing low-k material from a surface using an orbital polishing process.

Towery does briefly recite typical parameters for rotary CMP processing; polishing pressures of approximately 7 psi and a velocity of about 0.54 meters per second (column 5, lines 50-53). But, in the example that the Examiner relies upon to render the present invention obvious, the parameters recited are about 3.3 psi and a velocity of about 0.48 mps (column 7, lines 65-67). The elements disclosed by Towery are not 0.8 - 3.2 mps with a pressure 0.25 – 2 psi, as recited by the present invention, and while it may seem apparent to the Examiner that it would be obvious to one skilled in the art to ascertain such parameters, because of the complexities of working with delicate and brittle low-k materials, Applicants assert that one skilled in the art would not necessarily make such determination and apply such rotational parameters to orbital polishing parameters.

It is thus clear that no combination of Breivogel and Towery renders obvious claim 1 or any of claims 2-9 that depend therefrom because the references do not teach or suggest "An apparatus for polishing a surface of a workpiece, the surface including a low dielectric constant material" or, as the Examiner acknowledges, "a platen configured to orbit about an axis at a speed up to about 2000 revolutions per minute." As stated in previous responses, a careful reading of Breivogel only discloses an axial rate of 140-220 orbits/minute (column 5, lines 28-32), which is an order of magnitude less than that cited by the present invention. Accordingly, claim 1 and claims 2-9 that depend therefrom are not obvious over Breivogel in view of Towery and Applicants therefore request that the Examiner reconsider and withdraw this rejection.

Claims 2, 5-6 and 9 are additionally allowable over Breivogel in view of Towery. Claim 2 is allowable over the cited references because neither reference teaches or suggests a "platen is configured to orbit at about an axis at about 1000 orbits per minute." Claim 3 is allowable because neither reference teaches or suggest a "platen is further configured to dither" Claims 5 and 6 are additionally allowable over Breivogel and Towery because neither reference teaches or suggests a "platen...configured to move the workpiece relative to the polishing surface at a speed of about 0.8 to about 3.2 meters per second" as set forth in claim 5 or "the carrier is configured to apply about 0.25 to about 2 pounds per square inch pressure to the workpiece in the direction of the polishing surface" as set forth in claim 6.

Claim 26 is not obvious over Breivogel in view of Towery because no combination of the references teaches or suggests "A method for removing material from a surface of a workpiece, including low-k material" by including a step of "orbiting the polishing surface at a

speed greater than about 500 orbits per minute." Furthermore, because Breivogel does not teach or suggest any means for polishing a surface of a workpiece comprising low-k material, it would not be obvious for one skilled in the art to form the invention set forth in claim 26 and claims 27-29 that depend therefrom from the teachings of Breivogel in combination with Towery, which only teaches *oxidizing polishing slurries and rotational polishing*. Accordingly, Applicants request that the Examiner reconsider and withdraw the 35 U.S.C. §103(a) rejection to claims 26-29.

Claims 32 and 33 are similarly patentable over Breivogel and Towery because neither reference teaches or suggests "a workpiece carrier proximate the polishing surface, wherein the platen and the workpiece carrier are configured such that the surface of the workpiece and the platen move at a relative speed of about 0.8 to about 3.2 meters per second" as set forth in claim 32 or "moving the polishing surface and the workpiece comprising low-k material relative to each other at a speed of about 0.8 to about 3.2 meters per second" as set forth in claim 33. Applicants therefore request that the Examiner withdraw this rejection to claims 32 and 33.

Claim 10 stands rejected under the 35 U.S.C. §103(a) as being unpatentable over Breivogel in view of Towery and in further view of United States Patent No. 6,241,593 B1, issued to Chen et al. June 5, 2001 (hereinafter "Chen"). Applicants respectfully traverse this rejection.

Chen generally discloses a carrier head, including a bladder, for use with a *rotary* platen polishing apparatus. Nowhere does Chen teach or suggest that the polishing head disclosed in Chen could be used with a polishing apparatus including an *orbiting* polishing station or polishing a workpiece comprising low-k material. Thus, it would not be obvious to one skilled in the art to combine Breivogel and Towery with Chen and even if the references were combined, the combination of the references does not teach or suggest each and every element of claim 1, from which claim 10 depends. Specifically, no combination of the references teaches or suggests, "An apparatus for polishing a surface of a workpiece, the surface including a low dielectric constant material" or "a platen configured to orbit about an axis at a speed up to about 2000 revolutions per minute." Accordingly, claim 10 is allowable over the cited references and Applicants respectfully request that the Examiner withdraw this rejection to claim 10.

Claims 11, 30, and 31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breivogel as modified by Towery in further view of United States Patent No. 6,416,384 B1, issued to Kawamoto et al. July 9, 2002 (hereinafter "Kawamoto"). Applicants respectfully traverse this rejection as well.

Kawamoto only discloses a polishing apparatus including a *rotating* polishing table. Nowhere does Kawamoto teach or suggest an *orbiting* polishing apparatus or how one could combine the rotary platen teachings of Kawamoto with the orbiting polishing apparatus of Breivogel to form the claimed invention. Furthermore, even if Kawamoto, Breivogel and Towery were combined, the combination does not teach each and every element of the claimed invention. Specifically, the combination does not teach or suggest "An apparatus for polishing a surface of a workpiece, the surface including a low dielectric constant material" or "a platen configured to orbit about an axis at a speed up to about 2000 revolutions per minute" as set forth in claim 1, from which claim 11 depends or "A method for removing material from a surface of a workpiece, including low-k material" that includes "orbiting the polishing surface at a speed greater than about 500 orbits per minute" as set forth in claim 26, from which claims 30 and 31 depend. Accordingly, Applicants request that the Examiner reconsider and withdraw this rejection to claims 11, 30, and 31.

Claims 12, 13, 17-20, 22, 24 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breivogel as modified by Towery as applied to claims 1-9, 26-29, 32 and 33, and further in view of United States Patent No. 6,036,582, issued to Aizawa et al. March 14, 2000 (hereinafter "Aizawa"). Applicants respectfully traverse this rejection.

Aizawa et al. generally discloses a chemical mechanical polishing apparatus divided into a plurality of rooms cleaned to different degrees. Nowhere do any of Aizawa et al., Breivogel, or Towery teach or suggest any polishing apparatus or technique for removing material from a workpiece including low-k material by the parameters as set forth in independent claims 12 and 25. Several of the limitations of these claims as well as the respective dependent claims are directed to apparatus or process techniques designed to remove particular material from a surface of a workpiece including low-k material. Because neither Aizawa, nor Breivogel teach or disclose apparatus or method for removing material from a workpiece that includes low-k material and Towery only teaches oxidizing slurries that may be used in a CMP process, no combination of the references renders obvious by teaching any of Applicants' specific claim

elements directed to removing material from a work piece using an orbital polishing apparatus. The Examiner acknowledges, no combination of the references teaches or suggests a "platen configured to move relative to a workpiece surface at about 0.8 to about 3.2 meters per second and a workpiece carrier configured to apply about 0.25 to about 2 psi to a workpiece in the direction of the platen" as set forth in claim 25. Accordingly, Applicants request that the Examiner withdraw this rejection to claims 12, 13, 17-20, 22, 24 and 25.

Claims 14-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breivogel as modified by Aizawa and Towery and in further view of Chen Applicants traverse this rejection.

As previously noted, none of the cited references teaches or suggests any method or apparatus to remove material from a surface of a workpiece comprising low-k material using the particular polishing techniques taught or parameters set forth in the claims. Further, no combination of these references teaches or suggests "A polishing system for removing material from a wafer surface, the wafer including low-k material" or "a plurality of polishing stations, wherein at least one of said plurality of polishing stations includes a platen configured to move at about 0.8 to about 3.2 meters per second relative to the wafer comprising low-k material" as set forth in claim 12, from which claims 14-16 depend. Accordingly, claims 14-16 are patentable over the cited references and Applicants therefore request that the Examiner withdraw this rejection to claims 14-16.

Finally, claims 21 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breivogel as modified by Towery and Aizawa, and in further view of Kawamoto. Applicants traverse this rejection.

Claim 12 is not obvious in view of the cited references because no combination of these references teaches or suggests "A polishing system for removing material from a wafer surface, the wafer including low-k material" or "a plurality of polishing stations, wherein at least one of said plurality of polishing stations includes a platen configured to move at about 0.8 to about 3.2 meters per second relative to the wafer comprising low-k material." Accordingly, claims 21 and 23 that depend from claim 12 are not obvious in view of the cited references and Applicants therefore request that the Examiner reconsider and withdraw this rejection to claims 21 and 23.

Conclusion

In view of the above remarks, Applicants respectfully submit that the currently pending claims 1-33 (6 independent claims, 33 total claims) are allowable over the cited prior art.

Accordingly, Applicants respectfully request reconsideration and allowance of all pending claims. The Examiner is invited to telephone the undersigned at (602) 382-6226 at the Examiner's convenience, if that would help further prosecution of the subject Application. Applicants authorize and respectfully requests that any fees due under 37 C.F.R. §§ 1.16 or 1.17 be charged to Deposit Account No. 19-2814. **This statement does NOT authorize charge of the issue fee**.

Respectfully submitted,

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By: _____
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